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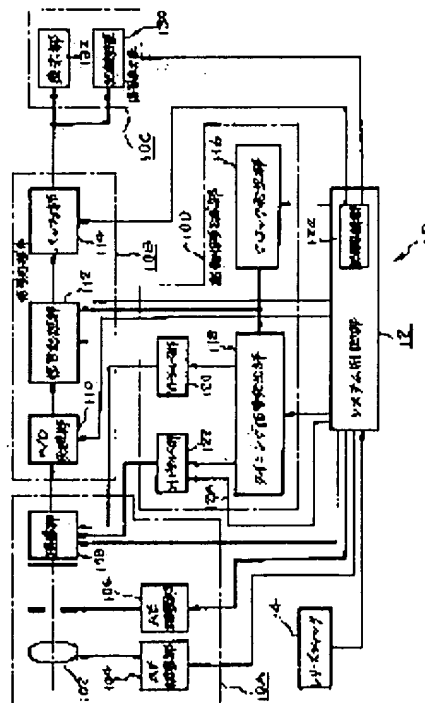
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(54) SOLID-STATE IMAGE PICKUP DEVICE AND SIGNAL READ METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a solid-state image pickup device that reads only a color G so as to result in reducing a time required for transfer of the signal horizontally and to provide a signal read method.

SOLUTION: A color separation filter is integrally provided to an incident light side to an image pickup section 108 of an image pickup system 10A of a digital still camera 10 in a form of a single board. At least the color filter of a color G is arranged to the color separation filter in stripes. A system control section 12 controls an output of a drive signal generating section 100 in response to depression of a release shutter 14. In the photometry control mode, the operation is switched by a horizontal timing signal from a timing signal generating section 118 and a control signal 12A and a drive signal is fed to the image pickup section 108. Thus, the image pickup section 108 extracts only the color G in the case of reading signal charges in this mode so as to reduce a time for reading by means of double speed reading.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] The image of a field is incorporated as an image, and this invention is used for a digital still camera, a picture input device, etc. which also perform automatic control of a focus and exposure based on the picture signal especially acquired by the image pick-up about the solid state camera and the signal read-out approach of also performing control using a picture signal, and is suitable while it performs and outputs signal processing to the incorporated picture signal.

[0002]

[Description of the Prior Art] The number of pixels of the image pick-up section tends to increase further with a demand called improvement in image quality. According to this inclination, time amount requires for read-out of the image pick-up signal from the image pick-up section increasingly for a long time. The drive approach of the image pick-up section which the duration of such signal read-out shortens has been proposed. The electronic image pickup device of JP,10-136244,A is in this example. According to this, an electronic image pickup device is 100. It is 20MHz, having the CCD image sensors (Charge Coupled Device : charge-coupled device) of a 10,000-pixel class. The display of an animation is enabled by the following drive frequencies.

[0003] In order to enable this display, at fast mode, it is CCD. When using the color filter of a Bayer array for image sensors, it is made to drive so that the picture signal of one line may be outputted every three lines. By the drive which thins out Rhine to this perpendicular direction, low drive frequency also makes high-speed signal read-out possible. Since control data is required for every frame in case an automatic focus adjustment device (henceforth AF), an automatic white balance (henceforth AWB), and a automatic exposure adjustment device (henceforth AE) are especially performed between animation display, the mode which adds and outputs the signal for continuation of three lines is adopted. Thus, shortening of the time amount of signal read-out is performed in the image by the technique of the perpendicular infanticide which thins out Rhine perpendicularly. AF and AWB which were mentioned above And in AE, the signal charge for continuation of three lines was added, and the control signal was searched for. Namely, color RGB of a primary color filter All were read and it is compounding.

[0004]

[Problem(s) to be Solved by the Invention] By the way, bearing the role with a luminance signal important for generation of the control data especially in AE and AF is known. And it sets to a solid state camera and they are three primary colors RGB in generation of a luminance signal. Inside and color G Having contributed is also known. In the case of this to a photometry, it is a color G. When it reads, it is expected that effective read-out can be performed.

[0005] however, the color filter of the Bayer arrangement mentioned above -- a single tier -- color RGB it is intermingled -- since it is arranged -- color G It is difficult to read.

[0006] This invention cancels the fault of such a conventional technique, and is a color G. It aims at offering the solid state camera and the signal read-out approach of shortening the time amount which reads and a horizontal transfer takes as a result.

[0007]

[Means for Solving the Problem] This invention is the three primary colors RGB which separate the color of the incident light from a field in order to solve an above-mentioned technical problem. Color G among color filters A color-separation means by which the color filter is arranged in the shape of a stripe, Two or more image sensors which are arranged two-dimensional corresponding to each color filter of this color-separation means, and carry out photo electric conversion of the light from this color-separation means to a signal charge, The perpendicular transfer way where the transfer component which transmits the signal charge obtained from each of two or more of these image sensors was arranged in the direction of a train, The level transfer way in which the transfer component which transmits the signal charge which intersects perpendicularly to this perpendicular transfer way, and which is supplied horizontally was arranged, An image pick-up means including the charge **** means with which the excessive signal charge obtained by each of a signal read-out means to shift each signal charge which two or more image sensors changed to said perpendicular transfer way, and two or more image sensors, by photo electric conversion is swept out, All the pixel read-out modes and the color G which read a signal charge from two or more image sensors of all when it expresses in the mode to read-out actuation of the signal charge from this image pick-up means A mode assignment means to specify the assignment read-out mode to read, The driving signal generation means which makes the period of the horizontal driving signal in assignment read-out mode shorter than all pixel read-out modes among the driving signals supplied to an image pick-up means according to directions of this mode assignment means, It is characterized by including the drive control means which performs control of this driving signal generation means according to a mode assignment means.

[0008] Here, in a color-separation means, it is a color G to the shape of a stripe. Allotted G A stripe, a G stripe RB check, and G A stripe RB perfect check or color G It is allotted in the shape of a tetragonal lattice, and is a color G. It inserts and they are the same colors R or B to a diagonal location. It is desirable that the pattern arranged on the perfect check allotted is used. By using this pattern, it is a color G. Read-out control can be easily performed now.

[0009] each according to the number of the electrodes to which, as for a driving signal generation means, a driving signal is supplied in all pixel read-out modes -- the 1st horizontal driving signal with which phases differ, and color G each [/ a number of an electrode of twice used in all pixel read-out modes in the assignment read-out mode to read] -- it is desirable to generate the 2nd horizontal driving signal with which phases differ. Thereby, time amount which level read-out in assignment read-out mode takes can be made into one half.

[0010] As for the period of the 2nd horizontal driving signal, it is advantageous that it is the one half of the period of the 1st horizontal driving signal. Thereby, horizontal infanticide can also be performed although only perpendicular infanticide was conventionally performed to high-speed read-out of a signal.

[0011] The solid state camera of this invention is a color G to a color-separation means. It is a color G by reading a signal charge with the generated driving signal, while a drive control means controls a driving signal generation means and making the driving signal corresponding to this mode generate for an image pick-up means, when the color filter has been arranged in the shape of a stripe and assignment read-out mode is chosen with a mode assignment means. It can take out. Since a period can be short read compared with the case where a horizontal driving signal is in all pixel read-out modes, a read time can be shortened.

[0012] Moreover, this invention is a color G to color separation of the incident light from a field. Two or more image sensors with which a color filter carries out photo electric conversion of the light to a signal charge corresponding to each color filter of the color-separation means arranged in the shape of a stripe, In the signal read-out approach of making a signal charge transmitting horizontally through the direction of a train further using the image pick-up means which arranged the charge **** means with which the excessive signal charge obtained from these image sensors is swept out from each image sensor with this image pick-up means All the pixel read-out modes and the color G which read a signal charge from two or more image sensors of all when it expresses in the mode to read-out actuation of the signal charge

from an image pick-up means The selection process which chooses the assignment read-out mode to read, The driving signal generation process which generates the driving signal which makes an image pick-up means drive following selection of this selection process, It is a color G by the driving signal generated at the driving signal generation process when assignment read-out mode was chosen among selections of a selection process. While accumulating a signal charge Color G accumulated after the signal are recording process which sweeps out the signal charge of colors R and B, and this signal are recording process The shift process which carries out the field shift only of the signal charge, It is characterized by including the level transfer process transmitted horizontally a period shorter than the read-out duration at the time of carrying out all pixel read-out of the signal charge transmitted according to the train transfer process of transmitting the signal charge in which the jump transfer was carried out by this shift process in the direction of a train, and this train transfer process.

[0013] Here, a driving signal generation process is the color G in assignment read-out mode. While storing up the signal charge obtained by photo electric conversion in an image sensor The 1st signal generation process which generates the signal corresponding to a color exception which sweeps out the signal charge of the image sensor corresponding to colors R and B, The 2nd signal generation process which generates the driving signal used for a shift process, and the 3rd signal generation process which generates the driving signal which makes the signal charge which carried out the jump transfer at the shift process transmit in the direction of a train, It is [after completing a transfer of the direction of a train of a signal charge] desirable to include the 4th signal generation process which makes the driving signal which makes this signal charge transmit a short period compared with the transfer period in all pixel read-out modes horizontally generate.

[0014] The signal read-out approach of this invention sweeps out the signal charge of colors R and B with the driving signal generated at the driving signal generation process in assignment read-out mode, and is a color G. By carrying out the field shift only of the signal charge which accumulates a signal charge, mixture of the signal charge of colors R and B is lost completely. Then, the read time of a signal charge is shortened not with perpendicular infanticide but with water Hiram length by carrying out a period shorter than the read-out duration at the time of carrying out all pixel read-out of the drive performed when transmitting a signal charge horizontally for having carried out the Rhine shift through the transfer to the direction of a train. Only this part that carried out time amount compaction has accelerated signal read-out.

[0015]

[Embodiment of the Invention] Next, with reference to an accompanying drawing, one example of the solid state camera by this invention and the signal read-out approach is explained to a detail.

[0016] The solid state camera of this invention has the description in making it the read-out relation of a signal which supplies the horizontal driving signal generated in high-speed read-out currently performed by infanticide of an old perpendicular direction with the color pattern of a color-separation means, and a driving signal generation means to an image pick-up means, and is different from the case of all the usual pixel read-out, and performing horizontal infanticide. It explains referring to drawing 1 - drawing 6 about the case where this solid state camera is applied to the digital still camera 10.

[0017] The digital still camera 10 is equipped with image pick-up system 10A, signal-processing system 10B, signal output system 10C, driving signal generation section 10D, the system control section 12, and the release shutter 14 as shown in drawing 1 . image pick-up system 10A **** -- the image pick-up lens 102, the AF controller 104 including a focus adjustment device, and AE controller 106 including a diaphragm device And the image pick-up section 108 It has. In addition, although not illustrated, it is the image pick-up section 108. A shutter style may be included in order to shade incident light completely to an incident light side.

[0018] Image pick-up lens 102 It is the image pick-up section 108 about the incident light from a field. It is the optical system which condenses so that a focus may be connected on a light-receiving side. AF controller 104 This justification is performed so that a lens may be arranged on the optimal location according to the information which ranged the distance of a photographic subject and a camera 10 according to the focus adjustment device (not shown), and was acquired. At this time, the controlled

variable from calculation and this ranging information of ranging information is processed in the system control section 12. Consequently, the control signal supplied is embraced and it is the AF controller 104. A focus adjustment device is made to drive and it is the image pick-up lens 102. It is made to move.

[0019] Moreover, AE controller 106 It extracts by control from the exposure control section (not shown) prepared in the system control section 12 in which calculation of the photometry value of a field including a photographic subject is performed, and the amount of flux of lights which is made to carry out the variation rate of the diaphragm of a device, and carries out incidence is adjusted. The photometry uses a part of image pick-up signal. Also in this case, light exposure is computed based on a photometry value in the system control section 12, and the control signal which extracts becoming this light exposure and controls a value and a shutter speed value is supplied to the AE controller 106. AE controller 106 It extracts according to this control signal, and the device and the shutter style are adjusted, respectively. Exposure can be made the optimal by this adjustment.

[0020] Image pick-up section 108 Two-dimensional array is carried out in the line writing direction and the direction of a train so that a light-receiving side may be formed by photo detector 108a which carries out photo electric conversion of the incident light supplied (see drawing 2). the image pick-up section 108 **** -- color separation filter CF to which photo detector 108a was alike, respectively, and the color filter which separates the color of incident light corresponded to the incident light side from photo detector 108a is formed in one with the veneer. By arrangement of this color separation filter CF, they are for example, the three primary colors RGB in photo detector 108a. The incident light which has the attribute of each color to say will carry out incidence. It sets to drawing 2 and this relation is Notation R, G, and B in a photo detector. It expresses. Moreover, generally the array of the color RGB of drawing 2 is G. It is the color filter array called a vertical SUTOTAIPU RB perfect check. the image pick-up section 108 Driving signal generation section 10D mentioned later from -- the driving signal outputted, respectively is followed. Each photo detector 108a consists of charge-coupled devices (henceforth CCD). Signal read-out gate (transfer gate) 108b is formed so that photo detector 108a may not leak the signal charge which received to the photo detector between the transfer components by which contiguity arrangement was carried out, i.e., a perpendicular transfer component, and was changed into it. Signal read-out gate 108b transmits a signal charge to perpendicular transfer way 108c from photo detector 108a by the field shift pulse supplied through an electrode. Perpendicular transfer way 108c carries out the sequential transfer of the read signal charge in the direction of a train, i.e., a perpendicular direction. A signal charge is supplied through the Rhine shift by perpendicular transfer, 108d of transfer components, i.e., the level transfer way, of a line writing direction. 108d of level transfer ways minds amplifier 108e for this signal charge following a driving signal, and they are signal-processing system 10B. It outputs.

[0021] signal-processing system 10B **** -- A/D A transducer 110 and the signal-processing section 112 And it has the buffer section 114. A/D Transducer 110 The control signal and the clock generation section 116 from the system control section 12 from -- a clock signal -- using -- the image pick-up section 108 from -- the analog signal supplied is changed into a digital signal. The changed digital signal is the signal-processing section 112. It is supplied. Signal-processing section 112 After carrying out white balance adjustment, a gamma correction, aperture correction, etc. to the acquired signal, signal processing is performed according to the two modes. That is, the mode here is signal output system 10C about the still picture which showed the mode set up with the release shutter 14 mentioned later, and was obtained at least. Recording device 130 It is [the still picture photography mode to incorporate and] only image pick-up system 10A. It is two of the photometry control modes in AE and AF.

[0022] It is controlled by the control signal from the system control section 12 whether which the mode is chosen for the electronic "still" camera 10 now. By this control, it is performed to the signal after signal processing mentioned above, modulation processing, for example, compression processing etc., predetermined in still picture photography mode etc. on the other hand -- the photometry control mode -- the system control section 12 -- the image pick-up section 108 from -- signal read-out -- for example, control read by **** compared with the conventional read-out rate is performed. In addition, it is signal output system 10C about an image pick-up signal. Display 132 Perpendicular infanticide processing etc.

is performed so that it may be made to display. the signal-processing section 112 modulation processing (compression) with still picture photography mode -- the image pick-up section 108 from -- it is made the video signal which can record an image pick-up signal. And the signal-processing section 112 Only the signal in the mode in which a display and record were chosen is outputted to the buffer section 114. [0023] The system control section 12 is a controller which controls actuation of the whole camera. The system control section 12 judges which mode was chosen by the input signal from the release shutter 14. The system control section 12 is driving signal generation section 10D based on this decision result. Actuation is controlled. In the system control section 12, it is record control-section 12a. It has prepared. Record control-section 12a A timing control signal is followed from the system control section 12, and it is the buffer section 114. And signal output system 10C Recording device 130 Actuation is controlled. [0024] driving signal generation section 10D **** -- the clock generation section 116 And the timing signal generating section 118 It is contained. Clock generation section 116 A synchronizing signal is generated based on the clock of the original oscillation generated, for example so that an electronic "still" camera 10 might drive with the present broadcasting format (NTSC/PAL), and it is the signal-processing section 112. It supplies. Although not illustrated, it is the clock generation section 116. A/D Transducer 110 Buffer section 114 The signal is supplied as a clock of a sampling signal, or a writing / read-out signal.

[0025] the timing signal generating section 118 The clock generation section 116 from -- a synchronizing signal -- the image pick-up section 108 The timing signal used for read-out of the obtained signal charge is generated. There are a vertical driving signal which drives a perpendicular transfer way, a horizontal driving signal which drives a level transfer way, a field shift, the timing signal which carries out the Rhine shift, etc. as this timing signal. moreover, the AF controller 104 and the AE controller 106 the time of controlling actuation -- the timing signal generating section 118 from -- the signal is used (not shown [a signal line]). Thus, while outputting to each part which mentioned various kinds of signals above, it is the timing signal generating section 118. It is V about a perpendicular timing signal and a level timing signal. Driver section 120 H Driver section 122 It supplies, respectively. In this, it is the timing signal generating section 118. When the control signal of the photometry control mode is supplied from the system control section 12, it is the timing signal generating section 118. For example, it raises to the photo detector of colors R and B, the substrate electrical potential difference, i.e., the overflow drain electrical potential difference, of a photo detector. The latter part explains these actuation further. V Driver section 120 H Driver section 122 A driving signal is generated to each timing. the rate which generally carries out signal read-out -- the mode -- responding -- V The driver section 120 from -- it is performed by the vertical driving signal switched and generated.

[0026] this example -- V The driver section 120 not only -- H The driver section 122 It switches according to the mode. Here, it is H. Driver section 122 Drawing 3 explains a rough configuration. H the driver section 122 **** -- four H It has driver 122a, 122b, 122c, 122 d, and switch section 122e corresponding to the mode. H In driver 122a and 122c, it is 12V and 5V. The electrical potential difference is impressed. H Driver 122a and 122c are outputted according to the level of the level timing signal H1 supplied, respectively. H The electrical potential difference of 8V and 1V is impressed to driver 122b and 122 d. H Driver 122a and 122c are outputted according to the level of the reversal signal H2 of the level timing signal H1 supplied, respectively. Signal H1S, H2S, H3S, and H4S become the signal of the amplitude of the range of 12V-5V from this. Moreover, signal H1B, H2B, H3B, and H4B are 8V-1V. It is the signal of the amplitude of the range. H Driver section 122 Control signal 12A to which the signal level outputted by selection section 122e corresponding to the mode is supplied according to the mode from the system control section 12 It chooses. In order that signal H1B, H2S, H3B, and H4S may enable it, as for selection section 122e corresponding to the mode, to choose signal H1S, H2B, H3S, and H4B at the time of the photometry control mode, a switch S10, S12, S14, and S16 are prepared. A switch S10, S12, and S14 and S16 are control signal 12A from the system control section 12 mentioned above when the photometry control mode was chosen. It is switched. The setting situation of drawing 3 is a color G at the photometry control mode. The situation when reading is shown. Thus, electrodes E1-E16 shown in drawing 4 in which eight selected signals are formed to the

transfer component of 108d of level transfer ways as a driving signal It is supplied, respectively.

[0027] the buffer section 114 The signal-processing section 112 mentioned above from -- while amplifying the video signal supplied to the predetermined amplitude, it has the function of the timing at the time of record etc. Buffer section 114 Record control-section 12a It is signal output system 10C by control. The image is outputted.

[0028] signal output system 10C **** -- recording device 130 And display 132 It has. Recording device 130 The video signal supplied to the semiconductor memory and the optical recording medium which are used for a magnetic-recording medium, a memory card, etc., or a magneto-optic-recording medium is recorded. Moreover, recording device 130 The recorded video signal is read and it is a display 132. It can also be made to display. In addition, this recording device 130 When a record medium can be carried out enabling free attachment and detachment, the video signal which removed only the record medium and was recorded with external equipment may be indicated by playback, or you may make it make an image print.

[0029] The release shutter 14 is equipped with the two-step push function in this example. That is, in the state of the 1st-step half-push, the photometry control mode is specified, and it supplies as a signal that this mode setting is made by the system control section 12, and is the system control section 122 about the incorporation timing of an image in all the push conditions of the 2nd step. While providing, it supplies as a signal that a record setup (still picture photography mode) of an image was made by the system control section 12 by this actuation. Moreover, when the release shutter 14 is a power-source ON state and the switch (not shown) of an image monitor display is turned on, the system control section 12 is a display 132. It controls to display the animation in movie mode.

[0030] Thus, actuation of the constituted digital still camera 10 is explained. The digital still camera 10 changes the release shutter 14 into a half-push condition in the case of the image pick-up of a field, and makes it the photometry control mode. In this case, image pick-up system 10A Image pick-up section 108 Color G among the signals acquired by carrying out photo electric conversion The image pick-up to take out is performed. Although high-speed signal read-out is performed by the driving signal in case this image pick-up is performed, it explains in full detail further in this signal read-out, therefore latter part. Image pick-up system 10A The acquired picture signal is signal-processing system 10B by control of the system control section 12. It is supplied. Signal-processing system 10B The picture signal then supplied is changed into a digital signal. The image data obtained by this conversion is supplied to the system control section 12 as photometry information. The system control section 12 calculates using this photometry information. By this operation, the system control section 12 generates the control signal for adjustment of AF and AE, and they are the AF controller 104 and the AE controller 106, respectively. It outputs. The AF controller 104 and AE controller 106 Adjustment according to the control signal supplied, respectively is performed through each device. This adjustment is repeatedly performed in this mode.

[0031] Then, a user changes the release shutter 14 into all push conditions to desired photography timing. At this time, the signal which records the image of this field on the system control section 12 is supplied. It is image pick-up system 10A like the previous mode. The image pick-up of the incident light from a field is performed. However, in this still picture photography mode, it is a color RGB. Processing which takes all out is performed in the image pick-up section 108. Naturally before this image pick-up, the driving signal supplied also differs from previous signal read-out. The picturized picture signal is signal-processing system 10B. A/D Transducer 110 It is 112 to the signal-processing section after being made the digital signal. It is supplied. Signal-processing section 112 Signal processing is performed to image data so that the image data then corresponding to a luminance signal and a color-difference signal may serve as a signal prolonged at high region side much more in frequency. And compression signal processing etc. is performed to the obtained image data, and it is the buffer section 114. It minds and is signal output system 10C. It is outputted. In still picture photography mode, it is record control-section 12a. The image data supplied by control is recorded on a recording device 132. Recording apparatus 132 It is record control-section 12a about the image data recorded for convenience although it had become the notation of only record. It can also read by control.

[0032] The digital still camera 10 is driving signal generation section 10D so that it can respond to any mode. Constituting is as having mentioned above. Driving signal generation section 10D H which can be set Driver section 122 It explains referring to drawing 3 and drawing 5 about actuation. The level timing signal H1 is H. Drivers 122a and 122c are supplied, respectively (see drawing 3). Moreover, the level timing signal H2 is H. Drivers 122b and 122d are supplied, respectively.

[0033] The transfer gate timing signal which carries out the field shift of the signal charge of the overflow drain electrical potential difference which specifies the storage capacitance of the signal charge generated as a driving signal at the time of light-receiving of image sensor 108a in still picture photography mode, and image sensor 108a through transfer gate 108b at perpendicular transfer way 108c is the image pick-up section 108. It is supplied. image sensor 108a -- the signal charge generated by all is transmitted to perpendicular transfer way 108c, when a transfer gate timing signal is supplied to transfer gate 108b. A vertical driving signal is supplied to the transfer component of perpendicular transfer way 108c, and a signal charge is transmitted in the direction of 108d of level transfer ways one by one. After arriving at the edge of perpendicular transfer way 108c, the Rhine shift on 108d of level transfer ways is performed. Thus, a signal charge is supplied to 108d of level transfer ways. The level timing signal H1 is supplied to 108d of level transfer ways.

[0034] In this mode, it is drawing 5 (a) in 108d of level transfer ways. They are a color G, R/B, G, R/B, and G so that it may be shown... The signal charge is supplied in order. In case a signal is read from 108d of this level transfer way by 4 phase drives, it is drawing 5 (a). The level timing signal H1 currently drawn corresponding to the lower part of a color pattern is supplied. It is H when the level timing signal of this period is supplied. Driver section 122 It sets to all pixel read-out, and is drawing 5 (a). It is drawing 5 (b) about the driving signal which combined the level timing signal H2 reversed although not illustrated with the level timing signal H1, As shown in (c), it is the image pick-up section 108. It supplies, respectively. Thereby, one step of signal charge progresses horizontally with one period of a driving signal. That is, one step of movement magnitude is four electrodes.

[0035] Next, G It sets to an image pick-up with a vertical stripe RB perfect check pattern, and is a color G. The case of the photometry control mode to read is explained. In this mode, it is driving signal generation section 10D. Image pick-up section 108 The overflow drain electrical potential difference to image sensor 108a which receives colors R and B among the overflow drain electrical potential differences to supply is raised. Thereby, the signal charge generated by colors R and B is swept out by the substrate by the way. Color G An overflow drain electrical potential difference is supplied from driving signal generation section 10D so that the signal storage capacitance of image sensor 108a may be secured. Moreover, by the field shift after image pick-up termination, it is this color G. A transfer gate timing signal is supplied only to corresponding transfer gate 108b. Consequently, in perpendicular transfer way 108c, it is a color G. There is only a signal charge. A signal charge is supplied to 108d of level transfer ways through the perpendicular transfer and Rhine shift.

[0036] Here, it is the color G in 108d of level transfer ways. It examines advancing two steps of signal charges one period of a driving signal. At this time, it sets on 108d of level transfer ways, and, originally is color R/B. Since the signal charge is not supplied to the transfer component of the field which should be made into the packet at all, this transfer component is also included, and it is a color G. It is regarded as a field and treats. Consequently, the range of each step which occupies an electrical potential difference with a fixed driving signal doubles. When it puts in another way, in order to perform this drive, it turns out that it is good to consider signal H1S and H1B to be the signals showing one condition. It is based on this idea and selection section 122e corresponding to the mode is signal H1B. Signal H1S and signal H2S Signal H2B and signal H3B Signal H3S And signal H4S Signal H4B It chooses. this selection -- control signal 12A if switched in this way -- drawing 5 (d) - (g) the shown relation -- each -- driving signal H1S, H2S, H1B, and H2B come to be outputted, respectively. At this time, a driving signal is drawing 5 (h) by this change, Color G which is shown in (i) and which was obtained alternatively It becomes the signal which progresses at a time by two steps, 8 [i.e.,], electrodes. By this control, a driving signal doubles [as a result] compared with the case where movement magnitude is all previous pixel read-out, by drive once. When this is converted in time and

considered, it turns out that a driving signal is acquired with a half period compared with the period of the driving signal which is supplied in the case of all pixel read-out. Thus, it is horizontal infanticide, 1/2 [i.e.,], by transmitting two steps of signal charges at once. Infanticide is performed. and G while it is a vertical stripe RB perfect check pattern -- the image pick-up section 108 Color G a signal charge -- the image pick-up section 108 in still picture photography mode from -- signal read-out -- one half It is thinned out and outputted.

[0037] In addition, if horizontal infanticide is performed by ****, it will be outputted further at the rate of twice. Consequently, the period of level read-out is one fourth in the case of all pixel read-out. It becomes.

[0038] It is a color G by this drive. The image data used for photometry control using a signal charge is obtained by the high speed. This image data is supplied to the system control section 12, and an operation is performed. AF adjustment and AE adjustment are performed based on this result of an operation. In the case of AF adjustment which acquires only a luminance signal, it is very effective today when increase of the number of pixels is demanded especially. At this time, the digital still camera 10 is performed at the rate of twice compared with the conventional photometry control.

[0039] High-speed read-out of the signal charge in the photometry control mode is G. It is not what is limited to a vertical stripe RB perfect check pattern. Were proposed that it should correspond to the sensibility fall produced with the cel area of the image sensor which becomes small with the increment in the number of pixels. It is the relation of the pitch of a pixel mutual in all directions One half The so-called honeycomb type which shifts every and is obtained of G A tetragonal lattice RB perfect check or G A tetragonal lattice RB check pattern is the level transfer way 108 similarly. High-speed read-out of a signal charge can be performed.

[0040] The G of a honeycomb mold A tetragonal lattice RB perfect check is an image sensor 108. It is [as opposed to / respectively / the core of a light-receiving cel] a pitch mutually. One half It is in the condition shifted and allotted every, and it is a color G. It is defined as the relation which set the pattern of relation with which the arrangement makes a square when its attention is paid, and the perfect checkered pattern which makes the same color the color located in a vertical angle when its attention is paid to colors R and B. drawing 6 (a) from -- clear -- as -- this pattern -- color G It stands in a line perpendicularly (namely, the direction of a train), and colors R and B are not contained. When it uses for this related owner effect, in still picture photography mode, it is drawing 6 (b). In 108d of level transfer ways, it is a color RGBGRGB so that it may be shown... The signal charge of each color can be made to output in order. And at the photometry control mode, it is a color G. By signal read-out, it is drawing 6 (c). In 108d of level transfer ways, it is a color G so that it may be shown. G G G ... It is obtained alternately. When this obtained signal charge is read with the timing signal in still picture photography mode twice the rate of level in the case of a level transfer, it is drawing 6 (c). A part for spacing and time amount are shortened and it can read.

[0041] Thus, by constituting, it is a color G at least. When arranged perpendicularly (the direction of a train), the signal charge of the color needed in each mode can be read. Simple fast transfer becomes possible, without taking into consideration the order of read-out of a complicated signal charge, since it can read alternatively by this even if the number of pixels increases. Therefore, when controlling like the photometry control mode, compared with the case where processing carries out by signal read-out like still picture photography mode using the information acquired by the signal charge to be used and its information, it can carry out quickly. When making photometry control of a digital still camera perform in fixed time amount, the burden placed on each actual device can be mitigated by time amount compaction of signal read-out.

[0042] In addition, if a signal charge is read in this way, it can also be made to apply also to the BEIYA pattern which was difficult until now.

[0043]

[Effect of the Invention] Thus, according to the solid state camera of this invention, it is a color G to a color-separation means. It is a color G by reading a signal charge with the generated driving signal, while a drive control means controls a driving signal generation means and making the driving signal

corresponding to this mode generate for an image pick-up means, when the color filter has been arranged in the shape of a stripe and assignment read-out mode is chosen with a mode assignment means. It can take out. Since a period can be short read compared with the case where a horizontal driving signal is in all pixel read-out modes, a read time can be shortened. When making photometry control of a digital still camera perform in fixed time amount, the burden placed on each actual device can be mitigated by time amount compaction of signal read-out.

[0044] Moreover, according to the signal read-out approach of this invention, the signal charge of colors R and B is swept out with the driving signal generated at the driving signal generation process in assignment read-out mode. Color G By carrying out the field shift only of the accumulating-signal charge signal charge By losing mixture of the signal charge of colors R and B completely, and carrying out a period shorter than the read-out duration at the time of carrying out all pixel read-out of the drive performed when transmitting a signal charge horizontally for having carried out the Rhine shift through the transfer to the direction of a train after this The read time of a signal charge is shortened not with perpendicular infanticide but with water Hiram length. Only this part that carried out time amount compaction has accelerated signal read-out. The burden placed on each actual device by this is mitigable.

[Translation done.]